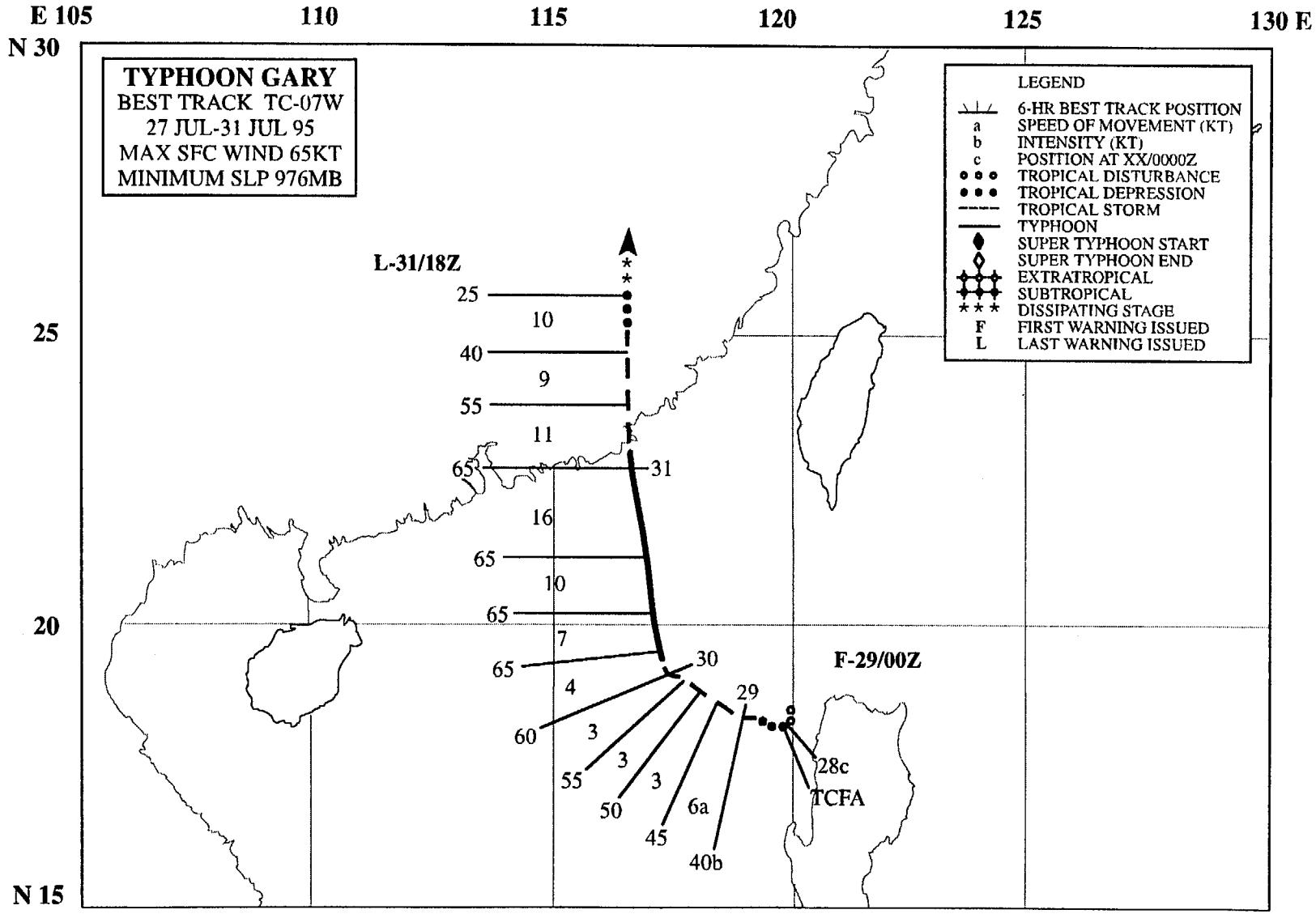
E 105
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TYPHOON GARY
BEST TRACK TC-07W
27 JUL-31 JUL 95
MAX SFC WIND 65KT
MINIMUM SLP 976MB
LEGEND
6-HR BEST TRACK POSITION
a SPEED OF MOVEMENT (KT)
b INTENSITY (KT)
c POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED
L-31/18Z
25
10
40
9
55
11
65
31
16
65
10
65
7
65
30
4
60
3
55
3
50
3
45
6a
40b
29
F-29/00Z
28c
TCFA

99

TYPHOON GARY (07W)

I. HIGHLIGHTS

Gary (07W) merged with Tropical Storm 06W during a time when both of these tropical cyclones were embedded within the circulation of a large monsoon depression near the island of Luzon (see also the summary of Tropical Storm 06W). Gary made landfall in southeastern China very close to the city of Shantou. Based upon ship reports received in a delayed mode on the Weekly Tropical Cyclone Summaries compiled by Mr. Jack Beven of the National Hurricane Center, and upon delayed reports of typhoon intensity wind speeds experienced in the city of Shantou that accompanied severe damage to a newly constructed sea wall, Gary was upgraded from a tropical storm to a typhoon in post-analysis.

II. TRACK AND INTENSITY

During the last week of July, a monsoon depression moved westward over the Philippine Islands. There were multiple low-level circulation centers in this monsoon depression — one of these became Tropical Storm 06W, and another became Typhoon Gary (07W).

As early as 270600Z July, when Tropical Depression 06W was making landfall on the island of Luzon, it was noted in the remarks section of JTWC's second warning for Tropical Depression 06W that a secondary circulation may be forming off the west coast of Luzon. On 28 July, as Tropical Storm 06W moved northward just east of Luzon, a Tropical Cyclone Formation Alert was issued at 280230Z July indicating the possibility of further development of the circulation west of Luzon. The Prognostic Reasoning Message that accompanied the 281200Z July warning on 06W included the following synoptic discussion:

". . . Infrared satellite imagery shows a broad region of convection that extends from 112°E to 135°E. Synoptic data indicate there are two distinct circulations in this region of convection . . . 06W is a well-defined [low-level circulation center] . . . just east of Luzon with minimum sea-level pressure estimated at 996 mb. . . . The second circulation evident in this broad region of convection is west of the island of Luzon, and the possibility exists for this area to also develop into a significant tropical cyclone . . ."

On the morning of 29 July, satellite imagery indicated that the circulation west of Luzon had become more organized. It was upgraded to Tropical Depression 07W at 290000Z. At 290600Z, Tropical Storm 06W was entrained into the circulation of Tropical Depression 07W — the final warning was thus issued on 06W, and 07W continued to move slowly westward in the South China Sea. At 291200Z, Tropical Depression 07W was upgraded to Tropical Storm Gary. The Prognostic Reasoning Message accompanying this warning included the following synoptic discussion:

". . . Tropical Depression 07W has intensified and has been upgraded to Tropical Storm Gary. Gary is tracking slowly to the north-northwest in the South China Sea. Satellite imagery indicates that the system has become more organized [and has absorbed] the remnants of former Tropical Depression 06W... Intensity estimates are based upon a combination of satellite analysis and . . . a 40 kt [21 m/sec] ship observation near the system center. . . ."

On 30 July, Gary accelerated northward and intensified. Shortly before 310600Z July, Gary made landfall near the city of Shantou in southeastern China (Figure 3-07-1). In real time, the peak intensity was estimated to be 60 kt (31 m/sec), however, in postanalysis, it was determined that Gary most prob-

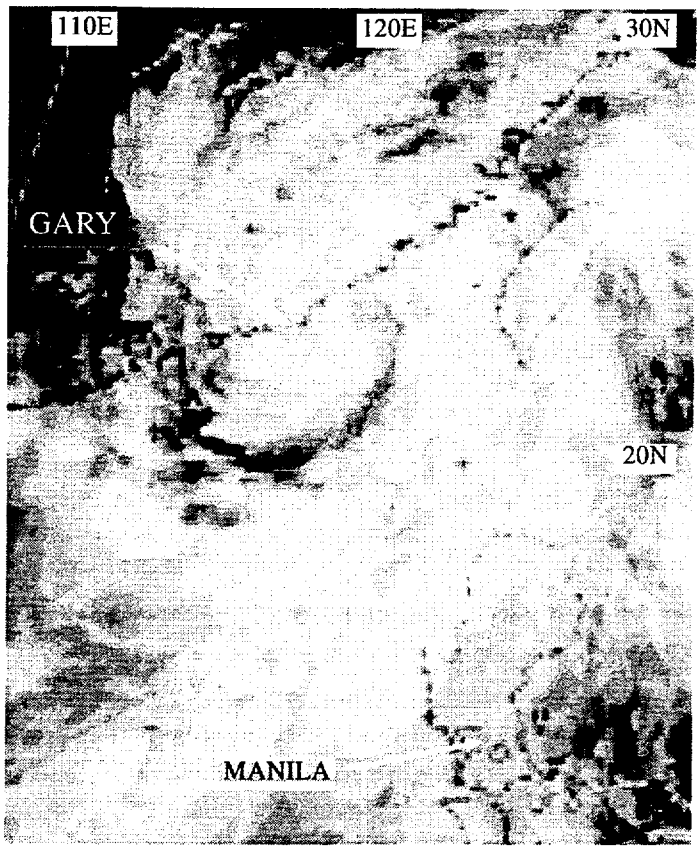

Figure 3-07-1 Gary becomes a typhoon shortly before making landfall near the city of Shantou (302331Z July visible GMS imagery).

ably became a typhoon a day earlier at 300600Z. Gary was well inland in southeastern China when JTWC issued the final warning valid at 311800Z July.

III. DISCUSSION

Island effects

The complex behavior of Tropical Storm 06W and the developing Gary (07W) while they were near the island of Luzon presented a unique forecasting challenge. Initially, as Tropical Storm 06W approached the Philippines, it was thought that it would pass across the islands into the South China Sea, and then intensify. When it stalled over Luzon, and a second circulation appeared to be forming off of the northwest coast of Luzon, it became unclear which circulation would dominate, or whether two would form and undergo a binary interaction.

A case can be made that TD 07W developed from a lee side low that formed off the northwest coast of Luzon as the center of the monsoon depression moved across the central Philippines. Another interesting feature to note is the binary interaction — at close range, and ending in merger — that 06W and 07W underwent for approximately 30 hours (Figure 3-06-2a,b). The after the fact upgrade to typhoon intensity at 300600Z was based on a 62 kt (32 m/sec) ship report that appeared in Mr. Jack Beven's Weekly Tropical Cyclone Summary #208. Gary appeared to have maintained minimal typhoon intensity until making landfall near Shantou a day later.

IV. IMPACT

A newly constructed sea wall was seriously damaged as Gary made landfall near the city of Shantou along the southeastern coast of China. No other reports of significant damage or serious injuries were received.

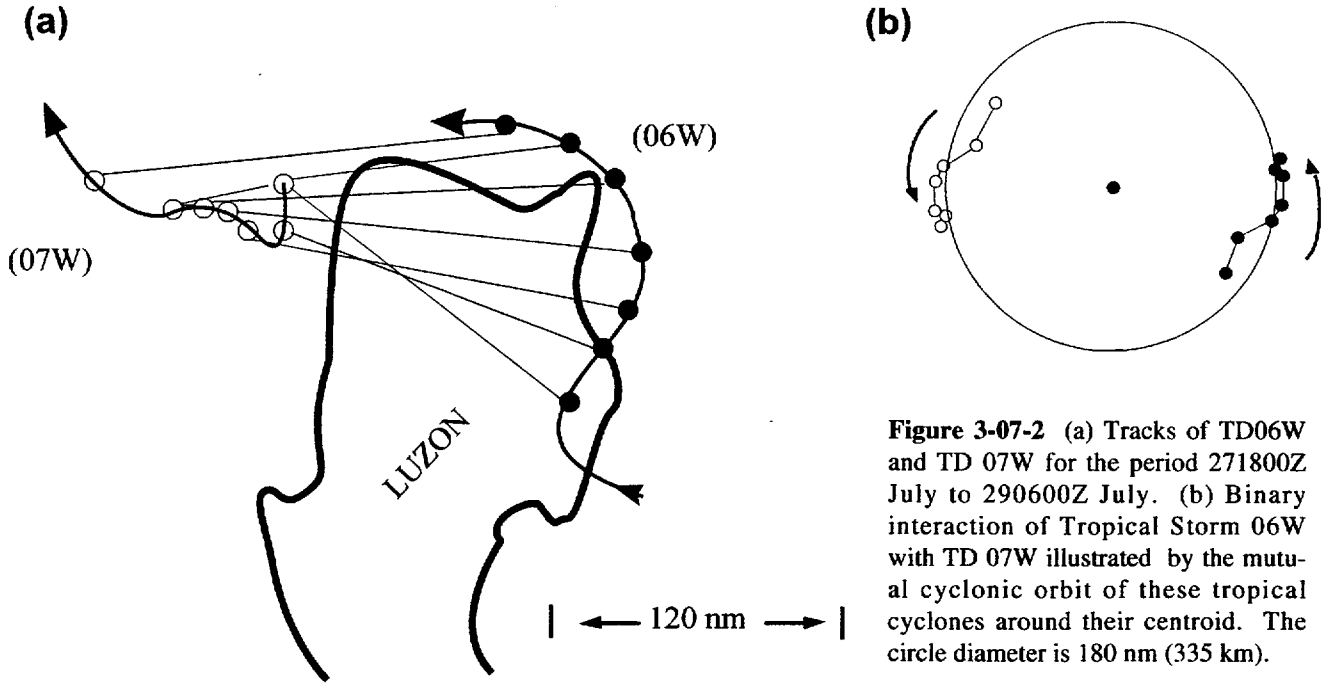

Figure 3-07-2 (a) Tracks of TD06W and TD 07W for the period 271800Z July to 290600Z July. (b) Binary interaction of Tropical Storm 06W with TD 07W illustrated by the mutual cyclonic orbit of these tropical cyclones around their centroid. The circle diameter is 180 nm (335 km).